

necessary preliminary to fruitful university education; that it is possible to combine literary and scientific training; that both in secondary and in higher teaching, if the teachers are to stimulate individuality in their pupils, they must be given time and opportunity to cultivate and develop their own; that examinations may be used to test the power of taking general views, as well as of remembering an infinity of details; and many other things, which France can teach us. But apart from intellectual profit, there is a moral profit in a meeting of this kind. Blessed are the peace-makers; and the discovery of unsuspected and deep human sympathies between workers in the same intellectual fields, between men and women whose business it is to train up the young minds of their own people, makes for the peace of Europe.

ECONOMIC ENTOMOLOGY.¹

(1) SINCE 1867 the State entomologists of Illinois have constantly issued very able reports on noxious and beneficial insects. The first were by Walsh and Le Baron; the last twelve have been by Prof. Forbes, the writer of the present work. In 1894 he issued the first part of "A Monograph of Insect Injuries to Corn." This extended to some 170 pages, with fifteen plates, and dealt only with those insects that attack the planted seed and the roots of corn of various kinds. This dealt mainly with wire-worm, white-grubs or chafer larvae, ants, aphids, their natural enemies and means of prevention. The second part that has just appeared is very much better than that issued nearly twelve years ago. It treats of the insect injuries to those parts of the corn plant above ground, including stalk, leaves, and ear.

A very excellent plan we do not remember having seen before is adopted in the text, namely, that of grouping the insects under the following three headings:—(1) the more important pests; (2) the less important pests; and (3) the unimportant species.

In dealing with the first it is pleasing to note that the insects are dealt with in a strictly practical manner. Such reports as these can well be made to serve a double purpose if properly drawn up as this one is, namely, as a reference book for practical men and also for those who are studying the subject from a student's point of view. The coloured plates, of which there are eight, include the army-worm, corn bill-bugs, the chinch bug, the corn-worm, white-grub, the seed-corn maggot, and other well-known corn pests. The plates are good, and show in some cases, not merely the perfect insect, but the whole life-history and the damage produced on the growing plant.

Among the more interesting sections we find a good account of the damage caused by the chinch bug (*Blissus leucopterus*, Say) and the means of preventing it, of the army-worm (*Leucania unipunctata*, Haw.), and of the corn-leaf louse (*Aphis maidis*, Fitch). In regard to the latter some interesting new observations are recorded, although nothing very definite has been arrived at in regard to the life-history of this corn pest. The author (p. 133) refers to "the failure of all attempts to find or produce a bisexual generation or an alternative food plant of *Aphis maidis* or to learn how and where it passes the winter."

Some interesting notes are given on several species of *Crambus*, called popularly in the States "sod web-worms" or "root web-worms" (Figs. 1 and 2). Although we have many species of *Crambus* in Europe, no very material damage has been recorded. In America we learn that "not infrequently these 'web-worms' become so abundant as to cause brown and deadened spots in a lawn or meadow, sometimes, indeed, deadening the turf as thoroughly as white-grubs or cut-worms can do." Corn seems to be very heavily injured and even completely destroyed over considerable areas in early spring. This is

¹ (1) "A Monograph of the Insect Injuries to Indian Corn." Part I. By S. A. Forbes. Twenty-third Report of the State Entomologist on the Noxious and Beneficial Insects of the State of Illinois. Pp. 273+xxxiii; 238 Figures and 8 Coloured Plates. (Chicago, 1905.)

(2) "Departmental Notes on the Insects that affect Forestry." By E. P. Stebbing, F.L.S., F.Z.S., F.E.S. No. 3, with Preface and Index to vol. I. Pp. 335-469+8 plates. (Calcutta: Government Printing Office, 1906.) Price 2s.

an attack we must be prepared for in many localities in this country when grass land is broken up, an unlikely proceeding, however, at the present day with the low price of corn. Probably a good deal of damage is done here now, but has been attributed to other causes. The figures given by Forbes are thus reproduced to give an idea of the larval stage, during which the damage is done.

In this country, again, we have not observed any injurious Syrphidae or hover flies, but we find recorded by Forbes (p. 162) that *Mesogramma politum*, Say, feed, not on Aphides, but on the pollen and juices of corn and cotton (Ashmead). The whole work is full of interesting and sound material alike to the practical man and student. One point we notice; the corn-worm or cotton-worm is still called *Heliothis armiger*, Hübner, instead of *Heliothis obsoleta*, Fabricius, which antedates it.

A key to the discussion of insect injuries to corn is given which will prove very useful to those studying the subject in America, and even elsewhere, for where species differ genera often agree in various parts of the world. A very complete bibliography and a copious index complete the work, which is useful to us in many regions other than America.

(2) This work contains a good deal of useful information and a lot of what appear scrappy notes, which will, however, serve a useful purpose later on. The great difficulty of working at such a subject as the one Mr. Stebbing is engaged upon can only be estimated by those who have attempted the like.

The economic entomologist is often too apt to jump at specific and even generic determinations, or is loth to

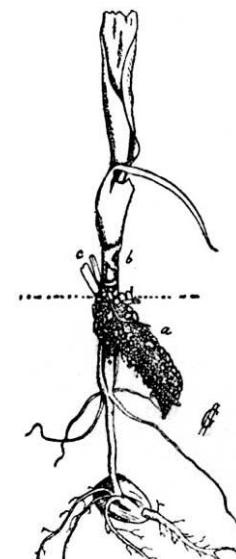


FIG. 1.—The Sod Web-worm (*Crambus*) web (a) containing larva, at base of young corn plant; b, c, injuries to leaf and stem.

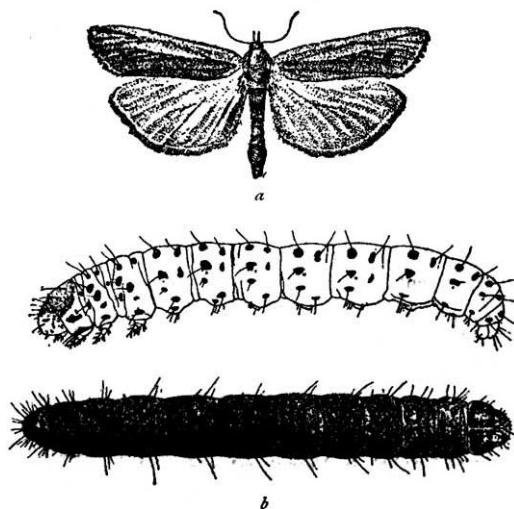


FIG. 2.—The Common Sod Web-worm (*Crambus triseptus*): a, adult slightly enlarged; b, back and side views of larva (much enlarged).

publish his observations unless the scientific name can be given. Some groups of insects are almost impossible to name specifically, and many others should only be treated by specialists, who have not always time or inclination to deal with the material sent them.

Nevertheless, it is very necessary that we should record the bionomics of arthropods of economic importance, even though we have to leave to some future date the scientific nomenclature, which in many cases is quite as diverse as the sometimes derided popular one! It is thus pleasing to find in this work valuable information recorded without waiting for even the definite generic status of the pest in question.

From p. 379 to p. 385 is detailed in a most able manner the life-history and workings of a cerambycid beetle, probably a *Stromatium*, which attacks the sandal-wood tree.

This "borer" is well known to be one of the most assiduous pests in the sandal-wood area of North Coimbatore, and yet Mr. Stebbing tells us that he is as yet unable to obtain any beetles and that he is not even sure of its generic position. So much is recorded, however, that one has only to find and name the beetle and fill in a few details and the account is complete. The sandal-wood borer will remain the same to the Indian forester, who is indebted to Mr. Stebbing for that work of special value, its life-history, whatever technical name it appears under later on. Other forest enemies are recorded in similar manner; sometimes the genus is doubtful, sometimes the species.

The most interesting part of this work deals with the bamboo beetle or shot-borer (*Dinoderus minutus*, Fabricius). This and allied species are often very destructive to bamboos.

It is shown that this species is the chief pest to bamboos in Calcutta and in the hotter, damper parts of the country, apparently taking the place of the *pilifrons* in Upper India.

In the account of this pest we find recorded some real practical work with regard to protecting bamboos from the ravages of this insect. The conclusions arrived at show that soaking the rods for five days in water, then drying them and soaking them for forty-eight hours in common Rangoon oil, is the best method of treatment. Other interesting wood-borers are also dealt with, including a goat-moth (*Duomitus leuconotus*, Walker) found in Calcutta, Sikkim, and Ceylon, which attacks the Cassia trees just as our goat-moth attacks the ash and oak; and there is also a very full account of the Casuarina bark-eating caterpillar (*Arbela tetraonis*, Moore), a wide-spread pest in Casuarina plantations, where it often does much damage.

An unusual, yet useful, diversion we note in this report is that at the end of each subject are mentioned the "points in the life-history requiring further investigation."

The plates are for the most part rather crude, but serve their purpose. The photogravure of bamboos tunneled into by the bamboo-borer is, however, an exception. A great foundation is being prepared in such a work as this; it is only a foundation, but, judging from what we have seen of this and others, it is one upon which we need not be afraid to continue building.

FRED. V. THEOBALD.

THE SOUTH-EASTERN UNION OF SCIENTIFIC SOCIETIES.

THE eleventh annual congress of the South-Eastern Union of Scientific Societies was held at Eastbourne on June 6-9 at the invitation of the local natural history society. On Wednesday evening, June 6, the retiring president, Prof. Flinders Petrie, opened the proceedings and gave up his chair to Dr. Francis Darwin, who delivered the presidential address. The title of the latter was "Periodicity," and in it Dr. Darwin pointed out that one of the most striking features of living things is their periodic or rhythmic character. Life itself may be described as a rhythm made up of alternate destruction and reconstruction. Protoplasm—"the physical basis of life"—is alternately falling to pieces by a degradation into simpler compounds and rebuilding itself from the food materials supplied.

In the address simpler instances were mentioned, such as are seen in the process of reproduction, for instance in the case of a plant, which produces a seed that gives rise to another plant, and so on. Again, allusion was made to the seasonal appearance and disappearance of the leaves of deciduous trees. Attention was turned to the time

limits between the earliest and latest unfolding of the leaves in various trees and to the attempts which have been made by phenologists to explain these periodic phenomena as being strictly regulated by temperature.

In the end, however, Dr. Darwin was able to show that the plant is really master of the situation, and not the temperature, for among other things buds in ordinary circumstances will not develop at the end of summer, and at this time it is much milder than in the spring, when they begin to unfold and grow into shoots. The plant is, in fact, guided by internal rather than external conditions, for the bud has to go through certain invisible changes during its winter's rest before it is ready for its normal growth, and these invisible changes are part of the plant's automatic rhythmic capacity which enables it to be independent, to a large extent, of external changes. The same arguments were found to apply to the daily movements of plants. Increase of temperature may cause flowers to open in the morning, but it has no effect at night. Again, leaves that show sleep movements by falling at evening from a horizontal position to one which is, roughly speaking, vertical, will, even if kept in the dark, return to their original station in the morning. At nightfall the sleep movements again occur, though as the plant becomes more and more unhealthy owing to the absence of light they are gradually lessened. Dr. Darwin described a very interesting case of habit in a sleeping plant, namely, the scarlet runner, which he recently demonstrated. Like other plants, the one in question adapts itself to one-sided illumination by placing its leaves obliquely so that they are at right-angles to the line of illumination, and get the full advantage of the light. If a scarlet runner which has assumed this oblique position is allowed to go to sleep at night as usual, and is then placed in a dark cupboard, it will in the morning assume the diurnal position as already mentioned in the case of other sleeping plants. Most remarkably, however, it does not return to its normal day position, that is, with horizontal leaves, but takes up the oblique position already described. This looks like a reminiscence of its former position, and is interesting psychologically since it might almost be described as an instance of a plant taking advantage of its individual experience.

Another experiment showing how a periodic movement had been induced, and pointing to a kind of memory on the part of a plant, was described by Dr. Darwin, who finally touched upon circumnutation, which he looked upon as the raw material out of which movement in response to stimuli has been developed.

During the congress several papers were read which showed, not only that the neighbourhood of Eastbourne is very rich in plants, birds, and insects, but that there are many keen naturalists in the county of Sussex. For instance, Mr. J. H. A. Jenner dealt generally with nature near Eastbourne, a communication by the late Dr. Whitney and Miss Milner treated upon the flora of the Eastbourne district, while Mr. Ruskin Butterfield compared the birds of Sussex with the list for Great Britain, showing that from the county in question there is a greater number of birds recorded than from any other.

On Thursday evening, June 7, Dr. Jonathan Hutchinson gave a powerful discourse on the educational value of museums. He emphasised the need for large and inexpensive buildings, and showed the great importance of museums now that it has been recognised that things, and not words, must be studied if the memory is to be of any real use. He dwelt on a graphic method of teaching history adopted in Haslemere Educational Museum, which he founded, and also alluded at length to the moral effect of proper education.

Two papers dealt with geology, namely, that on sea erosion and coast defence, by Mr. E. A. Martin, and the geology of the Upper Ravensbourne Valley, with notes on the flora, by Mr. W. H. Griffin. The former contribution summed up the present situation, and was particularly suggestive, while the latter showed how much useful work a naturalist can do who devotes his time ungrudgingly to a particular district.

At the reception given by the Mayor of Eastbourne, Mr. Edward J. Bedford gave a most successful lecture on bird architecture. The photographic lantern-slides which